Eight impacts of the digital sharing economy on resource consumption

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Abstract: Digital platforms have enabled huge efficiency in coordinating sharing practices among a large number of users. The proliferation of sharing platforms has formed a phenomenon often referred to – albeit not unanimously – as 'the sharing economy' or, more precisely, 'the Digital Sharing Economy (DSE)'1. What makes the DSE special is its ability to enhance access to a wide variety of material and immaterial resources within large and spatially distributed communities of consumers; a feature that could not exist in traditional, small-scale sharing. This characteristic has been known as the enabling role of digital Information and Communication Technology (ICT) in transforming sharing practices and scaling up sharing networks. Such extensive changes brought by digital advancements can raise a number of important questions concerning sustainability (Salomon and Mokhtarian, 2008), as changes often come along with both opportunities and risks. From a sustainability perspective, an evident impact of sharing resources is improved efficiency in consumption. Through sharing, the utilization of a resource increases to serve more demand, which translates to an optimization effect. Nevertheless, it is possible that increased efficiency is followed by unwanted impacts such as rebound effects. Therefore, to develop a critical perspective, efforts should be directed towards understanding and analyzing both the potential positive and negative impacts of the shared consumption promoted by digital platforms. Such analysis can be based on two major parts: First, identifying the type of the resource that is shared; second, investigating how sharing that resource can affect the sustainability of its consumption and other consumption patterns that it may promote.

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Perspective

Eight impacts of the digital sharing economy on resource consumption

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Digital platforms have enabled huge efficiency in coordinating sharing practices among a large number of users. The proliferation of sharing platforms has formed a phenomenon often referred to – albeit not unanimously – as 'the sharing economy' or, more precisely, 'the Digital Sharing Economy (DSE)'[1]. What makes the DSE special is its ability to enhance access to a wide variety of material and immaterial resources within large and spatially distributed communities of consumers; a feature that could not exist in traditional, small-scale sharing. This characteristic has been known as the enabling role of digital Information and Communication Technology (ICT) in transforming sharing practices and scaling up sharing networks. Such extensive changes brought by digital advancements can raise a number of important questions concerning sustainability (Salomon and Mokhtarian, 2008), as changes often come along with both opportunities and risks.

From a sustainability perspective, an evident impact of sharing resources is improved efficiency in consumption. Through sharing, the utilization of a resource increases to serve more demand, which translates to an optimization effect. Nevertheless, it is possible that increased efficiency is followed by unwanted impacts such as rebound effects. Therefore, to develop a critical perspective, efforts should be directed towards understanding and analyzing both the potential positive and negative impacts of the shared consumption promoted by digital platforms. Such analysis can be based on two major parts: First, identifying the type of the resource that is shared; second, investigating how sharing that resource can affect the sustainability of its consumption and other consumption patterns that it may promote.

Table 1 shows the different types of resources and their *shareability* (Pouri and Hilty, 2021). Following the table, the impacts of shared resource consumption are enumerated.

The impacts of shared resource consumption can be categorized as follows (a synthesis of the impacts of ICT, in general, and the DSE, in particular, on resource consumption (see also Pouri and Hilty, 2020)):

Optimization effect: The case where sharing a resource reduces the use of that resource by optimizing the consumption process through increasing utilization. The optimization effect of sharing is based on enhancing the lifetime efficiency of a resource defined as "the total number of functional units delivered over the service life of a technical resource " (Pouri and Hilty, 2020, p. 81), including all product/service systems involved in the consumption of that resource. The optimization effect can be further divided into two types:

1) Direct optimization effect: When the number of functional units produced by a resource (and its complementary resources) increases. Optimization can be in regard to the whole lifetime of a resource or per service it provides. Activating a car's *idle* capacity and occupying a car's *free* capacity by using Uber's typical ride services and BlaBlaCar's carpooling services, respectively, are relevant examples for optimizing resource utilization.

2) Cross-activity optimization effect: The case where sharing a resource results in the optimization of the production of another resource. For example, utilizing a shared space for food preparation can optimize food production processes.

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[1] For more on the term and a thorough conceptualization of the digital sharing economy, see Pouri and Hilty (2021).

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Table 1
Classification of sharable resources.

Broad classification of resources	Further classification	Type of 'shareability'	Description	Example of sharing service and platform
Material	Durable	Free capacity	Sharing the free capacity of a durable, material resource enhances its utilization through serving multiple demands *at the same time*.	Occupying free seats of a car via a carpooling service offered by platforms such as BlaBlaCar.
		Idle capacity	Sharing the idle capacity of a durable, material resource reduces its idle time – i.e., the time when the resource is not being used – and enhances its utilization through serving more demand *in sequence*.	Sharing a household tool via platforms such as Peerby.
	Consumable	Sufficient availability	Consumable, material goods can be shared in order to be sufficient for a group of consumers.	Food sharing via platforms such as OLIO and Eat with[a].
		Abundant availability	Consumable, material goods that are of abundant availability can be shared (e.g., to avoid wasting the surplus).	
Immaterial	Durable	Durable information goods	Refers to information products with timeless content – such as software products, music, or educational content – that allow for repeated use without fast degradation in value, applicability, effectiveness, etc.	Providing access to durable information goods in a sharing community[b,c].
		Competence	Sharing competence which is the sufficiency of knowledge, skill, etc. to perform a task effectively.	Helping others with tasks that require special skills. TaskRabbit is a familiar example of this category.
	Consumable	Consumable information goods	Refers to volatile information – i.e., information that loses value fast over time – such as real-time traffic information.	Platforms in which information is provided through community participation[b].
		Time	Sharing time as a resource which cannot be stored. This category refers to time as the only resource required to be shared in performing a task (no expertise or skill is required).	Platforms that enhance connections in neighborhoods through encouraging collaboration. pool.farm is a platform of this type that supports shopping tasks for a group of people.

[a] Distinguishing between the two types may not be possible without knowing the intention of the provider to share food with others.
[b] Prospective model.
[c] Note that platforms such as YouTube are not considered as an instance of the (digital) sharing economy (for more, see John (2017)).

3) Induction effect: Sharing a resource stimulates the consumption of other resources connected to it. For example, car sharing (where a car is the primary resource for shared use) may increase the consumption of fuel and mobility infrastructure (complementary consumptions for driving a car).

Substitution effect: When the shared resource and services based on it replace the use of another resource/service, a substitution effect has taken place. Two sub-categories can be considered for the substitution effect:

4) Direct substitution effect: Substitution occurs in the same service system. For example, the case where car sharing services provided by Zipcar replace the conventional car rental services provided by businesses in established industries.

5) Indirect substitution effect (also called cross-activity substitution effect in Salomon and Mokhtarian (2008)): The case where substitution occurs with respect to other service systems. For example, a shared mobility scheme (Zipcar, Uber, Publibike, etc.) replaces public transportation.

Rebound effect: Increased resource efficiency is followed by an increase in the demand, which consequently outweighs the efficiencies:

6) Direct rebound effect: The case of rebound effect occurring within the same resource or service system. For example, affordable accommodation provided by Airbnb enables guests to use more of the platform's services.

7) Indirect rebound effect: The case of rebound effect occurring outside the same resource or service system. This means that savings (including time and money) gained from consuming an efficient service are spent on other consumption. For example, when the cost efficiency of accommodation offered by Airbnb is spent on air travel.

8) Degradation effect: The condition whereby the intensified utilization of a shared resource leads to its faster degradation. A relevant example is the case of e-scooters wearing out fast in sharing schemes (Hollingsworth et al., 2019).

To conclude, exploring the impacts of shared consumption promoted by the digital platforms operating in the domain of the DSE requires an understanding of how sharing a resource of a particular type (as indicated in Table 1) can affect the sustainability of its consumption and other consumptions connected to it (as laid out in eight impact types). It is also of crucial importance to note that approaching and answering this broad question can provoke narrower questions that require appropriate assumptions and/or comprehensive examinations of the intensity and distribution level of the use and adoption patterns of digital sharing platforms as special applications of ICT (Salomon and Mokhtarian, 2008).

Declaration of Competing Interest

The author declares that he has no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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